

CLAIMS

1. A method of exposing components (4), carried by a carrier tape (2) at a picking position (22),
5 the components being positioned in sequence along the carrier tape and covered by a cover (3),
the cover being attached to the carrier tape at a first and a second rim portion of the cover, which rim portions are arranged on a first and a second side of the
10 sequence of components, respectively,
the cover having a lower surface facing the sequence of components, and
the carrier tape having a first portion (31) and a second portion (32) to which said first and second rim
15 portion of the cover is attached, respectively,
comprising the steps of:
while feeding the carrier tape towards the picking position, separating said first rim portion of the cover from said first portion of the carrier tape, and guiding
20 a thus loosened portion of the cover towards the second side of the carrier tape, so as to expose the components at the picking position, and
performing said guiding such that before reaching the picking position, while being raised to an upright
25 position, the cover is automatically gathered by being folded, so that at least two portions of the lower surface of the cover face each other, thereby reducing the height of the cover.
- 30 2. A method of exposing components (4), carried by a carrier tape (2) at a picking position (22),
the components being positioned in sequence along the carrier tape and covered by a cover (3),
the cover being attached to the carrier tape at a
35 first and a second rim portion of the cover, which rim portions are arranged on a first and a second side of the sequence of components, respectively,

the cover having a lower surface facing the sequence of components, and

the carrier tape having a first portion (31) and a second portion (32) to which said first and second rim portion of the cover is attached, respectively,
5 comprising the steps of:

while feeding the carrier tape towards the picking position, separating said first rim portion of the cover from said first portion of the carrier tape,

10 guiding a thus loosened portion of the cover towards the second side of the carrier tape,

before said separated rim portion of the cover reaches the picking position, gathering said cover by folding, while it is raised to an upright position, such that at least two portions of the lower surface of the cover face each other, thereby reducing the height of the cover, and

keeping the cover gathered by the use of wall means (24), which is arranged at the second side of the picking position, while said cover passes the picking position.
20

3. A method according to claim 1 or 2, which further includes the step of guiding the cover (3) so that tensions are introduced in said cover, which tensions
25 cause the cover to gather by said folding.

4. A method according to any one of the preceding claims, which further comprises the step of guiding the cover (3), such that the ratio (R) between:

30 a first distance (D1), which is the distance (BC) between a first point (B), where the cover is separated from the carrier tape (2), and a second point (C) on the second side of the sequence of components (4), where the cover has been gathered by being folded, while raised to an upright position, such that at least two portions of
35 the lower surface of the cover face each other, when said

distance (BC) is projected on a direction parallel to the feeding direction of the carrier tape, and

5 a second distance (D2), which is the transversal distance (AB) from said first portion of the carrier tape substantially up to said second portion of the carrier tape along the lateral direction,

is between about 2.5 and 6, preferably between about 4 and 5, and more preferred about 4.5.

10 5. A device for exposing components (4), carried by a carrier tape (2) at a picking position (22),

the components being positioned in sequence along the carrier tape and covered by a cover (3),

15 the cover being attached to the carrier tape at a first rim portion and a second rim portion of the cover, which rim portions are arranged on a first and a second side of the sequence of components, respectively,

the cover having a lower surface facing the sequence of components, and

20 the carrier tape having a first portion (31) and a second portion (32) to which said first and second rim portion of the cover is attached, respectively, comprising:

25 means (33) for separating said first rim portion of the cover from the first portion of the carrier tape, and means for guiding (26) a thus loosened portion of the cover towards the second side of the carrier tape, while the cover is being fed towards said picking position, so as to expose the components at the picking position,

30 wherein

said means for guiding said loosened portion of the cover is arranged such that before reaching said picking position, the cover is raised to an upright position, and automatically gathered by being folded, so that at least
35 two portions of the lower surface of the cover face each other, thereby reducing the height of the cover.

6. A device according to claim 5, wherein said means for separating (33) a rim portion of the cover (3) and said means for guiding (26) said loosened portion of the cover are arranged so, that they introduce such tensions in the cover, that the cover is gathered by said folding.

7. A device according to claim 5 or 6, further comprising wall means (24) arranged at the side of the picking position (22) for keeping the cover (3) gathered while said cover passes the picking position.

8. A device for exposing components (4), carried by a carrier tape (2) at a picking position (22),
the components being positioned in sequence along the carrier tape and covered by a cover (3),
the cover being attached to the carrier tape at a first and a second rim portion of the cover, which rim portions are arranged on a first and a second side of the sequence of components, respectively,
the cover having a lower surface facing the sequence of components, and
the carrier tape having a first portion (31) and a second portion (32) to which said first and second rim portion of the cover is attached, respectively,
comprising:
means for separating (33) said first rim portion of the cover from the first portion of the carrier tape, and
means for guiding (26) a thus loosened portion of the cover towards the second side of the carrier tape, while the carrier tape is being fed towards the picking position,
means for gathering the cover by folding, while said cover is raised to an upright position, so that at least two portions of the lower surface of the cover face each other, thereby reducing the height of the cover, and

wall means (24), which is arranged at the side of the picking position, for keeping the cover gathered while said cover passes the picking position.

5 9. A device according to claim 7 or 8, wherein the wall means (24) is substantially parallel to the feeding direction of the carrier tape (2).

10 10. A device according to any one of claims 7-9, wherein the wall means (24) also comprises roof like means (29), covering a slot like passage, being formed by the wall means (24) and a portion of the tape guide wall (13), through which passage the gathered cover tape (3) passes at the side of the picking position (22).

15

11. A device according to any one of claims 7-10, wherein said means for separating (33) a rim portion of the cover (3) and said means for gathering the cover by folding are arranged such that the ratio (R) between:
20 a first distance (D1), which is the distance (BC) between a first point (B), where the cover is separated from the carrier tape, and a second point (C) on the second side of the sequence of components (4), where the cover has been gathered by being folded, while it was
25 raised to an upright position, such that at least two portions of the lower surface of the cover face each other, when said distance (BC) is projected on a direction parallel to the feeding direction of the carrier tape and

30 a second distance (D2), which is the transversal distance (AB) from said first portion (31) of the carrier tape substantially up to said second portion of the carrier tape along the lateral direction is between about 2.5 and 6, preferably between about 4 and 5, and more
35 preferably about 4.5.

12. A tape guide comprising an exposing device according to any one of the claims 5-11, wherein said tape guide is a self contained unit.

- 5 13. A device for exposing components, carried by a carrier tape (2) at a picking position,
the components being positioned in sequence along the carrier tape and covered by a cover,
the cover being attached to the carrier tape at a
10 first rim portion and a second rim portion of the cover, which rim portions are arranged on a first and a second side of the sequence of components, respectively,
the cover having a lower surface facing the sequence of components, and
15 the carrier tape having a first portion and a second portion to which said first and second rim portion of the cover is attached, respectively, comprising:
a separator for separating said first rim portion of the cover from the first portion of the carrier tape, and
20 a guide which guides a thus loosened portion of the cover towards the second side of the carrier tape, while the cover is being fed towards said picking position, so as to expose the components at the picking position,
wherein said guide is arranged such that before it
25 reaches said picking position, the cover is raised to an upright position, and automatically gathered by being folded, so that at least two portions of the lower surface of the cover face each other, thereby reducing the height of the cover.
30
14. A device according to claim 13, wherein said separator and said guide are arranged so, that they introduce such tensions in the cover, that the cover is gathered by said folding.
- 35 15. A device according to claim 13 or 14, wherein a wall is arranged at the side of the picking position for

keeping the cover gathered while said cover passes the picking position.

16. A device for exposing components, carried by a carrier tape at a picking position,

the components being positioned in sequence along the carrier tape and covered by a cover,

the cover being attached to the carrier tape at a first and a second rim portion of the cover, which rim portions are arranged on a first and a second side of the sequence of components, respectively,

the cover having a lower surface facing the sequence of components, and

the carrier tape having a first portion and a second portion (32) to which said first and second rim portion of the cover is attached, respectively, comprising:

a separator for separating said first rim portion of the cover from the first portion of the carrier tape, and a guide for guiding a thus loosened portion of the cover towards the second side of the carrier tape, while the carrier tape is being fed towards the picking position,

a gathering unit for gathering the cover by folding, while said cover is raised to an upright position, so that at least two portions of the lower surface of the cover face each other, thereby reducing the height of the cover, and

a wall, which is arranged at the side of the picking position, for keeping the cover gathered while said cover passes the picking position.

30

17. A device according to claim 15 or 16, wherein the wall (24) is substantially parallel to the feeding direction of the carrier tape.

18. A device according to any one of claims 15-17, wherein the wall comprises a roof portion, covering a slot like passage, which is formed by the wall and a

portion of the tape guide wall, through which passage the gathered cover tape passes at the side of the picking position.

- 5 19. A device according to any one of claims 13-18, wherein said separator for separating a rim portion of the cover and said gathering unit for gathering the cover by folding are arranged such that the ratio between:
- 10 a first distance (D1), which is the distance between (BC) a first point (B), where the cover is separated from the carrier tape, and a second point (C) on the second side of the sequence of components, where the cover has been gathered by being folded, while it was raised to an upright position, such that at least two portions of the
- 15 lower surface of the cover face each other, when said distance (BC) is projected on a direction parallel to the feeding direction of the carrier tape, and
- a second distance (D2), which is the transversal distance (AB) from said first portion of the carrier tape
- 20 substantially up to said second portion of the carrier tape along the lateral direction is between about 2.5 and 6, preferably between about 4 and 5, and more preferably about 4.5.
- 25 20. A tape guide comprising an exposing device according to any one of the claims 13-19, wherein said tape guide is a self contained unit.